

Listing of Claims

This listing of claims replaces all prior versions, and listings, of claims in the application:

1. (Previously Presented) A method comprising:

patterning a substrate with a substantially arbitrary arrangement of features, comprising

patterning an array of repeating lines and spaces between the lines in an first photoresist layer,

introducing irregularity into an area on the substrate covered by the array of repeating lines and spaces, wherein introducing irregularity comprises forming an arbitrary figure in a second photoresist layer above the array, wherein the arbitrary figure comprises a first feature and a second feature that are noncontiguous and that each bridge one or more of the repeating lines and spaces at different longitudinal positions.

2. (Previously Presented) The method of claim 1, wherein forming the arbitrary figure comprises exposing and developing the second photoresist layer above the array.

3. (Previously Presented) The method of claim 1, wherein patterning the substrate further comprises etching a substrate through portions of the array not covered by the arbitrary figure.

4. (Original) The method of claim 1, wherein introducing irregularity comprises reducing the continuity of at least a portion of the array, the array formed using an interference lithography system.

5. (Previously Presented) The method of claim 4, wherein reducing the continuity of the portion of the array comprises cutting spaces into the array.

6. (Original) The method of claim 1, wherein introducing irregularity comprises reducing the continuity of the portion of the array resulting from a projection lithography patterning.

7. (Original) The method of claim 1, wherein patterning the substrate further comprises etching the substrate using the substantially arbitrary arrangement to direct the etching.

8. (Original) The method of claim 1, wherein patterning the substrate further comprises patterning the substrate with the substantially arbitrary arrangement having a pitch yielding a k_1 factor smaller than or equal to 0.4.

Claims 9.-15. (Canceled)

16. (Previously Presented) A method comprising:

interfering electromagnetic radiation to illuminate a substrate with an interference pattern, the interference pattern imparting a first photoresist layer on the substrate with repeating lines and spaces; and

introducing irregularity into an area on the substrate covered by the repeating lines and spaces to impart an arbitrary feature arrangement to the substrate, wherein introducing irregularity comprises forming an arbitrary figure in a second photoresist layer above a portion of the repeating lines and spaces, wherein the arbitrary figure comprises a first feature and a second feature that are noncontiguous and that each bridge one or more of the repeating lines and spaces at different longitudinal positions.

17. (Original) The method of claim 16, wherein introducing irregularity comprises ending continuity of a trench at an arbitrary position along the trench.

18. (Previously Presented) The method of claim 16, wherein introducing the irregularity further comprises exposing and developing the second photoresist layer above the portion of the repeating lines and spaces.

19. (Previously Presented) The method of claim 16, wherein introducing the irregularity further comprises transferring the arbitrary figure to the portion of the repeating lines and spaces.

20. (Previously Presented) The method of claim 19, wherein introducing the irregularity further comprises patterning the substrate using the arbitrary figure to define the arbitrary feature arrangement.

21. (Original) The method of claim 16, wherein interfering electromagnetic radiation comprises imparting, to the substrate, first features having a pitch yielding a k_1 factor approaching 0.25 in a single patterning step.

22. (Previously Presented) A method comprising:
patterning a first layer on substrate using a first lithographic technique, the patterning providing lines and spaces in a the first layer with a first pitch yielding a first k_1 factor smaller than or equal to 0.5;

printing, in a photoresist layer using a second lithographic technique providing a second pitch, a first feature to bridge a first collection of one or more of the repeating lines and spaces at a first longitudinal position, a second feature to bridge a second collection of one or more of the

repeating lines and spaces at a second longitudinal position, and a third feature to bridge a third collection of one or more of the repeating lines and spaces at a third longitudinal position, wherein the first feature, the second feature, and the third feature are noncontiguous and wherein the second pitch is two or more times larger than the first pitch; and

etching the substrate to transfer, to the substrate, a superposition of the lines and spaces with the first feature, the second feature, and the third feature, wherein the continuity of at least the first collection, the second collection, and the third collection is broken in the transferred superposition.

23. (Previously Presented) The method of claim 22, wherein patterning the first layer on the substrate using the first lithographic technique comprises providing first lines and spaces with the first pitch yielding the first k_1 factor approaching 0.25 for a single patterning step.

24. (Previously Presented) The method of claim 22, wherein patterning the first layer on the substrate using the first lithographic technique comprises patterning the substrate using interference lithography.

25. (Previously Presented) The method of claim 22, wherein printing the first feature, the second feature, and the third feature comprises patterning using a binary mask.

26. (Previously Presented) The method of claim 22, wherein printing the first feature, the second feature, and the third feature comprises using the second lithographic technique providing the first feature, the second feature, and the third feature with the second pitch yielding the second k_1 factor greater than 0.5.

27. (Previously Presented) The method of claim 22, wherein breaking the continuity further comprises exposing and developing the photoresist layer.

28. (Previously Presented) The method of claim 22, wherein etching the substrate comprises etching a portion of the substrate not covered by the arbitrary figure.

Claims 29-36 (Canceled).

37. (Previously Presented) A method comprising:
patterning a first layer of photoresist on a substrate using interference lithography to provide a collection of periodic lines and spaces having a first pitch;

patterning a second layer of photoresist using a second lithographic technique to provide an arbitrary feature with a second pitch, wherein the second pitch is two or more times larger than the first pitch and wherein the arbitrary figure comprises a first feature and a second feature that are noncontiguous and that each bridge one or more of the repeating lines and spaces at different longitudinal positions; and

etching the substrate to transfer a superposition of the lines and spaces provided by patterning the first layer and the arbitrary feature provided by patterning the second layer to the substrate, wherein the continuity of at least one of the lines and spaces is broken at the different longitudinal positions in the transferred superposition.